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A Study of Snake Bites Admitted to a Hospital in Rhodesia

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The relative abundance of snake species varies geographically. The commonest venomous snakes in Salisbury are probably the Rhombic Nightadder (*Causus rhombeatus*) (Fig. 1), Egyptian Cobra (*Naja Haje*) (Fig. 4) and Boomslang (*Dispholidus typus*). In the majority of cases identification of the type of venous bite cannot be obtained as the patient fails to bring the snake to hospital. The purpose of this paper will be to review the main features noted in a retrospective series of 186 cases of snake bite seen at Harare Hospital, Salisbury, between January, 1967, and December, 1971, and to provide a brief account of the main features of the common snakes seen in the Salisbury area.

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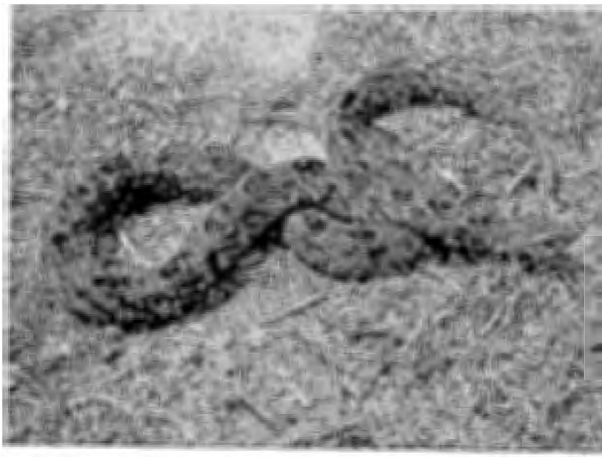


(Fig 1)
RHOMBIC NIGHT ADDER
Causus rhombeatus
Mount Hampden, Salisbury, Rhodesia.

Table 1

TACHYCARDIA AND CYTOTOXIC REACTION IN DIFFERENT AGE GROUPS

Age group (years)	Total No. of Patients	Pulse>90/min.*	(In patients with tachycardia) Extensive cytotoxic reaction	
			Present	Absent
Less than 26	124	33 (26,6%)	20	13
26 and above	60	11 (18,3%)	3	8
Overall	184	44 (23,9%)	23	21

*Figures in brackets refer to the percentage of all cases who had a tachycardia.

METHOD AND MATERIALS

The case notes of 186 patients admitted following a snake bite were examined. In each case the age, sex, site and main morphological features of the bite, and prognosis of the patient were noted. The month of the year was also noted to ascertain whether or not a seasonal incidence of snake bites occurs. The main features of seven common snakes seen in the Salisbury area will be presented.

RESULTS

(*a*) *Age and Sex*:

One hundred and ten patients were less than 20 years of age; 57 were 20-39 years, and 19 were more than 39 years of age (Fig. 2). The overall male : female ratio was 1,3 : 1.

(*b*) *Extent of local reaction to Snake Bite*:

Twenty-three patients had severe cytotoxic reactions, characterised by oedema of the entire affected limb (with or without necrosis). Patients below 26 years of age had more extensive local cytotoxic reactions (13 per cent.) than older patients (5 per cent.). (Table 1.)

(*c*) *Systemic effects*:

Thirty-three patients who were less than 25 years of age (26 per cent.) had a pulse rate above 90 per minute (Table 1). Blood pressure measurements were not available in those less than eight years of age, and in the remainder, none had a systolic pressure recorded below 100 mm Hg. Eleven of the patients over 25 years (18,3 per cent.) had a pulse rate above 90 per minute and one was hypotensive.

Of the patients who presented with tachycardia, 20 (60 per cent.) of those less than 26 years of age and three (27,3 per cent.) of the older patients and evidence of local cytotoxic changes. The patient mentioned above who had a blood pressure of 90/60 mm Hg., a pulse of 125/minute, also showed extensive necrosis with blistering. It should be emphasised that these observations are based upon a retrospective survey and that the true incidence of severe local cytotoxic reaction may be much higher.

There were two patients in this series who were known to have developed a bleeding disorder. One female patient developed a severe coagulopathy with thrombocytopaenia, a prolonged prothrombin time, hypofibrinogenaemia and severe bleeding following a boomslang bite. The bleeding disorder was reversed following heparin and specific antivenene administration. Details of this case have been reported elsewhere (Riley, 1971), and the subject has been reviewed by De Vries and Cohen (1969). The second patient developed a severe cytotoxic reaction, thrombocytopaenia and temporary prolongation of the prothrombin time after a bite probably due to a puff adder (Levin and Wapnick, 1972).

(*d*) *Seasonal incidence*:

The peak seasonal incidence of snake bites occurs from October to April (Fig. 3). There

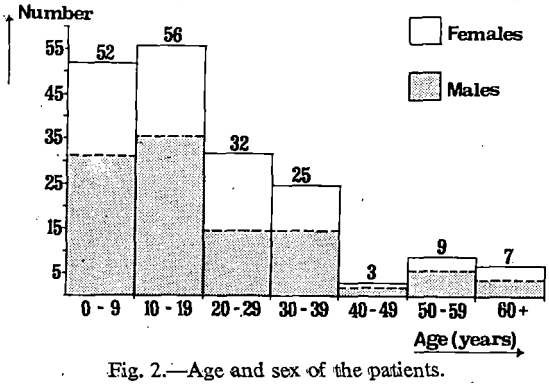


Fig. 2.—Age and sex of the patients.

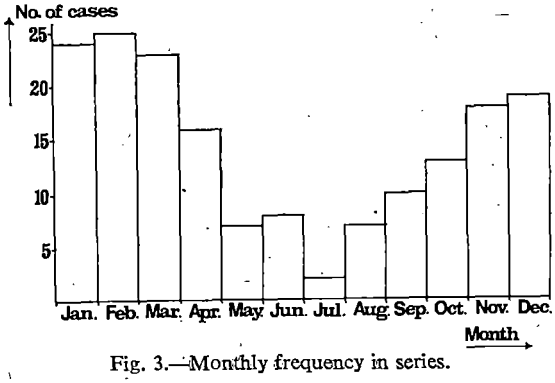


Fig. 3.—Monthly frequency in series.

were 26 cases seen in the month of February, whereas the figure for July was two.

(*e*) *Mortality*:

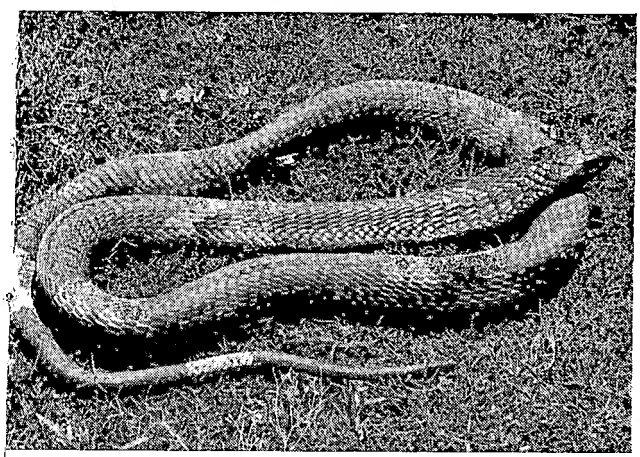
There were no cases in this series who died. This does not exclude the possibility that some patients may have died before reaching hospital.

VENOMOUS SNAKES OF SALISBURY DISTRICT

Seven venomous snakes found in the Salisbury district are potential sources of serious snake bite cases.

The Boomslang (*Dispholidus typhus*) is a back-fanged species which secretes a particularly potent venom. It is a rather slender tree snake averaging about 1,5 metres in length, readily identified by its short head and very large eyes, combined with oblique keeled body scales. Juveniles are brown or blackish above with blue spots on some scales, the belly is finely stippled with red-brown and the eye is bright green. Adults are green, often with black-edged scales (usually males) or olive-brown (usually females). Although a common snake throughout Rhodesia, the boomslang rarely bites anybody because its good eyesight enables it to keep out of man's way most of the time.

The Egyptian Cobra (*Naja haje*) (Fig. 4) is a common snake around Salisbury. It is a heavily-built snake, averaging 1,5 to 2 metres in length. Colouring varies from yellowish (especially juveniles) through shades of brown to black, while some specimens are strikingly banded in black and yellow. When this cobra rears up and spreads its "hood", there is a broad dark band across the front of it. This species can be distinguished from other cobras by a series of small scales below the eye; in other cobras these are absent and the shields that border the lip also enter the eye.



(Fig. 4)
EGYPTIAN COBRA
Naja haje annulifera (Banded phase)
Umtali, S. Rhodesia.

(Fig. 5)
BLACK MAMBA
Dendroaspis polylepis
Kapami, Wankie, Rhodesia.

The Mozambique Spitting Cobra (*Naja mossambica*) is not common in the Salisbury district as it prefers lower altitudes. It has been collected in the Borrowdale area and on the Golden Stairs Road. This cobra rarely exceeds 1,5 metres in length and is light grey or olive above, salmon pink below. The "hood" is narrow when spread and has a series of irregular black bands and blotches on its anterior face. It is the only snake in this area which can project its venom into the eyes of an adversary.

The Black Mamba (*Dendroaspis polylepis*) (Fig. 5) is scarce around Salisbury, but is known from the Golden Stairs Road, Borrowdale and Arcturus. Averaging nearly 2,5 metres in length, it has a long, coffin-shaped head, slender body and long tail. The colour is usually olive-brown or greyish, lighter below, with the inside of the mouth blackish.

The Burrowing Adder (*Atractaspis bibronii*) is a small burrowing snake which is most frequently encountered after rain. Averaging less than half a metre in length, it is purple-brown to black above; brown, white or mottled below. It does not open its mouth to bite, the long fangs being brought down on each side of the compressed lower jaw. Many amateur snake-catchers are bitten by this vicious little snake, often suffering permanent damage to fingers.

The Rhombic Night-adder (*Causus rhombeatus*) is one of the commonest snakes around Salisbury. Averaging a little over half a metre in length, the ground colour is usually olive or pinkish brown, with a darker V-marking pointing forward on the head and a series of large blotches on the back (some specimens completely lack these markings). Most night-adder bites merely cause local pain and swelling and leave no after effects.

The Puff-adder (*Bitis arietans*) is not found in central Salisbury, but has been recorded from the Golden Stairs Road, Borrowdale and Hatfield. Averaging about 0,75 metre in length, it is heavy-bodied with a broad flat head and a slender neck. It is usually brown or yellowish with a series of backward pointing black and yellow chevrons on the back. This snake is responsible for most of the serious snake-bites in Africa.

DISCUSSION

The majority of patients bitten by a venomous snake and seen at Harare Hospital, Salisbury, recover completely within 3-6 days. The fact that there were no deaths recorded in this series lends support to the impression that the Rhombic Night-adder is responsible for most of these bites. The rapid onset of symptoms and the early appearance of lymphangitis is the hallmark of the majority. A few patients, however, develop systemic toxicity with tachycardia, mycocarditis and in severe cases, hypotension (Levin and Wapnick, 1972). It is our policy to admit all patients bitten by venomous snakes, elevate the affected limb and administer tetanus toxoid. Although we administer penicillin and phenergan to these patients, we have no proof of their exact value. We have not used calcium gluconate (Strover, 1955), or steroids in the management of these cases (Strover, 1964).

If the snake has been captured and fangs are shown to be absent, antivenom is contra-indicated. We cannot support the widely recommended viewpoint that antivenom should be administered to all people bitten by a venomous snake as serious untoward reactions may occur. In the minority of cases where severe local or systemic reaction is evident during the first few hours following a bite (usually following a puff-adder or cobra bite), specific antivenom is indicated. These patients may require intensive supportive therapy with intravenous fluid administration, with electrolyte, acid-base, urinary output and central venous pressure monitoring.

Antivenom should only be administered after subcutaneous and intravenous test doses have been given. Even if there is no anaphylaxis with the test dose, the antivenom should be administered by controlled drip infusion and the rate of flow monitored carefully against the patient's pulse and blood pressure. Furthermore, if the antivenom is to be given, it is pointless giving less than 70-100 ml. (Reid, 1968). The administration of 10 ml. antivenom as a routine procedure in cases of snake bite is not only ineffective, but could be highly dangerous.

The application of a tight tourniquet on a limb for a long period may seriously impair the circulation of the affected part. Tourniquets should probably be used in elapid bites until specific antivenom can be administered. Mason (1963) recommends that the tourniquet should be removed for half-minute intervals 30, 50 and 90 minutes after a bite, and must be discarded two hours after its initial application.

The presence of a severe, local cytotoxic reaction with extensive gangrene of the skin suggests that the bite is due to that of a puff-adder. One should, however, refrain from extensive excision or amputation of the limb unless it is obvious that its circulation is inadequate. Where possible, excision should be delayed until a clear line of demarcation is evident. In one patient we considered that an above-knee amputation would be necessary. The leg was elevated, the hypotension corrected and three weeks later an excision of the superficial necrotic skin performed. The greater part of the gastrocnemius and soleus tendons were destroyed, but she was able to walk and did not require a prosthesis.

An interesting finding in this study is the high percentage of young patients who showed severe local reactions. The more severe reaction in the younger age group could be accounted for on the basis that venom concentration is greater where the confined area of the bite is smaller (Reid, 1968). For the same reason a bite on the toe, for example, will produce a more severe cytotoxic reaction than one of the skin overlying the posterior tibial compartment.

It is useful to remember that systemic poisoning caused by venomous snakes is only evident after the first 30-60 minutes following the bite. If the patient shows immediate systemic features with clouding of consciousness, tachycardia, sweating and tachyphoea, it can most likely be attributed to the patient's response to fear at having been bitten. The presence of local oedema and lymphangitis are helpful signs in the diagnosis of bites due to venomous snakes. As a rule, a severe clinical response to snake bites can be anticipated if marked symptoms are evident one or two hours following the bite.

Table 2

MAIN FEATURES OF SNAKE BITES OCCURRING IN THE SALISBURY AREA

	Viperidae	Elapidae	Colubridae
Examples	1. Rhombic Night-Adder 2. Puff Adder 3. Burrowing Adder	1. Egyptian Cobra 2. Mozambique Spitting Cobra 3. Black Mamba	Boomslang
Fangs	Anterior	Anterior	Posterior (grooved)
Attachment of fangs to jaw	Mobile Fangs erected during the act of biting	Fixed Permanently erect	Permanently erect
Toxin (main effect)	Cytotoxic	Neurotoxic	Haemorhagic
Bite marks (fangs)	pair (more severe local reaction)	pair (minimal local reaction)	Often multiple and ragged
Antivenom	None except for severe cases of puff adder bites	Cobra Antivenom (for Cobra) Polyvalent Mamba antivenom (for mamba)	Specific Monovalent (Obtained from S.A. Med. Res. Inst., Johannesburg)

Patients bitten by a colubrid snake (e.g., boomslang) (see Table 2) require specific antivenom in addition to supportive therapy. Fortunately bites by a boomslang are rare. If severe fibrinogen depletion with haemorrhage occur in a patient recently bitten by a venomous snake in Rhodesia, specific boomslang antivenom should be obtained by urgent air-freight from the South African Institute of Medical Research, Johannesburg. Further treatment, other than blood transfusion, includes small amounts of intravenous heparin if an associated coagulopathy is present, or Trasylol if excessive fibrinolysis is evident.

Although the main toxic effects of the individual snakes in Rhodesia correspond in general with that in Table 3, it should be noted that the venom of certain snakes of the same family order in other parts of the globe have different toxic properties. The Malayan pit viper (Reid, *et al.*, 1963) and *Echis coloratus* in Israel (Fainau, *et al.*, 1970) causes severe haemorrhagic reaction. Montgomery (1959) reported the occurrence of ophthalmoplegia due to the neurotoxic effect of a Berg-adder bite.

Although no death was recorded in this series of cases admitted to a hospital in Salisbury, there have been 21 deaths caused by snake bites in Rhodesia during a five-year period (Castle, 1971). These findings indicate that the majority of severe snake bites fail to reach hospital, or alternatively the cases of snake bites in other parts of Rhodesia have more serious sequelae.

SUMMARY

The main features noted in a review of 186 cases of snake bites admitted to Harare Hospital have been reviewed. Several local systemic reactions were more frequent in the younger patients. The maximum number of snake bites occur between October and February. The review shows that the majority of patients bitten by a venomous snake in the Salisbury area make a rapid recovery and do not require antivenom administration. We find that high elevation of the affected limb is the single most useful factor in securing rapid recovery.

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